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Congenital Cardiology Solutions

REAL TIME THREE DIMENSIONAL TRANSESOPHAGEAL ECHOCARDIOGRAPHY COUPLED WITH DIAGNOSTIC CATHETERIZATION TO DETERMINE LEFT VENTRICULAR PRESSURE-VOLUME RELATIONSHIPS AND MYOCONTRACTILITY

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Background: We investigated left ventricular (LV) pressure volume relationships (PVR) and myocontractility indexes using real time three-dimensional transesophageal echocardiography (RT3DTEE) and conductance catheterization (CC).

Methods: CC used 6 F catheters in the LV via right carotid cut-down (Millar, MPVS Ultra) in pigs. Simultaneous CC and RT3DTEE (single beat, X7-2 X matrix, iE33, Philips) data were obtained with the animal ventilated (end-expiration), and paralyzed in 3 conditions (3 measurements in each): baseline, inferior vena caval (IVC) occlusion, and IVC occlusion during dobutamine. CC derived LV pressures (Labchart) were integrated with RT3DTEE volumes (QLab) on a beat-to-beat basis using ECG trigger signal. From CC and RT3DTEE PV loops, end systolic PVR (Emax) were determined.

Results: In 6 pigs studied, there were excellent agreements between the RT3DTEE and CC for parameters derived at baseline and with dobutamine. At baseline, the mean ± SD (mmHg/mL) were Emax-CC 1.86 ±1.1 and Emax-RT3DTEE 1.78 ± 1.2 (p= 0.50). On dobutamine, mean Emax-CC was 3.43 ± 1.5 and Emax-RT3DTEE 3.60 ± 1.23 (p= 0.17). Emax normalized to end diastolic volumes were 0.034 ± 0.02 for CC and 0.033 ± 0.02 for RT3DTEE at baseline (p=0.43); these were 0.081 ± 0.04 and 0.084 ± 0.03 respectively on dobutamine (p=0.13).

Conclusion: Emax can be determined from RT3DTEE, and agrees well with CC. Derivation of PVR and Emax using RT3DTEE permits integration of intrinsic myocardial functional parameters in the clinical context.